

## REMARKS

Claims 1– 51 are pending.

### **Interview Summary Record**

One of applicants' attorneys, Gordon D. Coplein (Reg. No. 19,165) thanks the Examiner for his courtesy in granting an interview in this application on July 8, 2008. During the interview a proposed amendment to claim 1 was discussed, as well as the principal reference to Kennedy et al US 2004/0218582. No agreement was reached as to the allowability of claim subject matter.

During the interview the Examiner asked where the subject matter relating to the power law distribution and the random (Gaussian) distribution of connection of nodes was discussed. Reference is made to the last paragraph of page 1 and the first paragraph on page 2 of the specification as well as the subject matter beginning on the last four lines of page 8 and carrying over to page 9.

Claim 1 as presented in this amendment is amended in a manner different from that which was discussed with the Examiner during the interview. This claim and the other independent claims have been amended to more closely correspond to one aspect of the invention in that connectivity relationships between the nodes (agents) that are being considered are of a statistical type. That is, the topologies that are considered are those of the number of agents in the network of a plurality of agents to which each agent is connected. This is discussed in detail below.

The Action is responded to using the same section headings and paragraph numbers.

### **Specification**

1. The specification is objected to as failing to provide proper antecedent for the claimed subject matter on which the claims are rejected under 35 USC §112. This is discussed below.

## **Claim Rejections - 35 USC §112**

2.-3. Claims 1, 5, 6, 23, 42, 47, 48, 50 and 51 are rejected as containing subject matter not described in the specification. The claim language is specifically addressed in paragraph 4.

4. The Examiner refers to the language in claim 1 of “establishing a topology to address each of a plurality of system topology criteria” and of claim 42 of “establishing a topology to address each one of a plurality of different criteria” as not being supported in the specification. Applicants respectfully disagree with this. In the specification, two examples of system agent connectivity topologies are given in many places. One topology is similar to that of the “power curve” type, i.e., more agents are connected to fewer of the other agents, so as to make the system relatively robust against random agent (node) failure. A second topology is a random one in the agents are connected to each other in a distribution that is more similar to a “bell (Gaussian) curve” so that the system will be more robust against attack on individual agents (nodes). There can be other criterion of connectivity distributions between these two.

The claim language objected to should be considered on the basis that, for example, one criterion is the scale free power curve connectivity distribution and a second is the random bell curve connectivity distribution. That is, does the current system topology of agent degree distribution connectivity relationships correspond more closely to the topology of one or the other of these criterion. Support for this is found in the specification. One place is page 4, second paragraph. “The data processing system further includes a topology tuning function that obtains information that is descriptive of the topology and, based at least in part on the obtained information and on at least one criterion...”. That is, the system is measuring current topology against at least one criterion which is a type of topology such as the scale free distribution or random distribution. Thereafter the tuning function makes a recommendation as to how to modify the connectivity relationships between the agents so that the system connectivity topology matches the connectivity topology of a criterion.

Another place for support is at page 8, line 13 which states:

“To determine whether the (current) system topology was more scale-free or random in character (criteria), the topology tuner agent 20 compares the shape of the histogram against two alternative representations (criteria), the Gaussian distribution and the power-law distribution, using conventional statistical curve-fitting techniques. The closer the histogram is to a

Gaussian distribution (criterion), the more "random" is the topology, while histograms that resemble the power-law distribution indicate a scale-free topology." (*parentheticals added*).

A histogram is a graph that shows, e.g., on the x axis each of the agents and on the y- axis the number of other agents to which the one agent on the x-axis is connected. Again, scale free and random are the criteria and their topologies are already established so that the comparison can take place.

References also made to the following part of page 2 of the specification:

For the purposes of this patent application, a "scale-free network" is any network of relationships in which the degree-distribution of the nodes is characterized by a power law. The "degree" of a node denotes the number of connections a given node has with other nodes, i.e., the number of relationships (or relationships of a given type) that a given node is in. Thus, for scale-free networks, the histogram of node-degrees has the feature that relatively fewer nodes are found to have relatively higher degrees, with the overall relationship following a power-law curve.

After the determination is made, the topology tuner makes a recommendation as to how the current system topology can be changed to meet one of these criteria so as to establish a new system topology that corresponds to the topology of one of the criteria.

As discussed below, the independent claims have been amended to be directed to the agent degree distribution connectivity relationships. That is, to how many of the other agents does an agent have a connectivity relationship.

5. Claims 1, 5, 6, 23, 42, 47, 48 and 51 were rejected on the same basis as discussed above with respect to paragraphs 1. - 4. Applicants submit that the claim language is supported as demonstrated above.

6. Claim 5 is rejected based upon using the term "approaching". This claim has been amended to correspond to the subject matter disclosed in the first two paragraphs of page 16 of the specification which describes that the recommendation is made after the current system topology has exceeded a threshold of having drifted from a desired topology. Reference is also made to claim 12.

It is submitted to the rejections based on the specification failing to provide proper antecedents and the claims being indefinite are not appropriate for the reasons given above. Therefore, these rejections should be withdrawn.

### **Claim Rejections - 35 USC §101**

Claims 23 – 46 and 47 – 51 are rejected as being based upon non-statutory subject matter. Claims 23 – 39 and 41 are amended to recite a computer readable storage medium storing the software agent. Claim 40, which had this feature, has been cancelled. Thereafter the claims recite the computer code that performs the operation. This type of claim has been found to be acceptable and the storage medium can be of any type such as discs, semiconductor memory, etc.

The rejection of claims 42-46 is addressed by amendment, adding “node” and “computer readable medium”. Support for the latter is noted above, and for the former is at page 1 line 22 and page 2 lines 7-12 at least, shown at Fig. 1 as worker agents and a tuner agent (page 7, lines 1-5). Claim 43 is amended in view of the amendment to claim 42. This is seen to address the 35 USC 101 rejection to claims 42-46.

The rejection of claims 47 - 51 appears to be in error. These claims depend from claim 1, which is a method claim.

It is submitted that all of these rejected claims recite proper statutory subject matter and are deserving of a full action on the merits.

### **Claim Rejections - 35 USC §102**

7. - 21. Claims 1, 5, 15, 21, 23, 24, 26, 42, 43, 47, 50 and 51 are rejected as being anticipated by Kennedy et al US 2004/0218582. Each of the independent claims 1, 23 and 42 has been amended to recite that there is a topology of agent degree distribution connectivity relationships for each of a plurality of criteria. The “degree distribution” refers to the number of the plurality of agents to which each of the agents is connected. This language appears at page 2 of the specification and is quoted above. As explained above by way of example, these topologies correspond to the criteria such as the degree distribution of agent connectivity relationships for a scale free power law or a random Gaussian connectivity distribution. The independent claims also set forth that information is obtained of the current topology of the system as well as information of how the current topology compares to the topology of at least one of the established system criteria. Based upon this information, a recommendation to one or more of the agents to modify its connectivity relationship or relationships relative to those of the other agents in order to achieve a new system degree distribution connectivity topology that more

closely matches the topology corresponding to a selected one of the plurality of established criteria.

To put the amendments into perspective, the Examiner's attention is directed to Figure 1 and page 8 of the specification. At page 8, an example is described in which the current degree distribution connectivity topology is such that all of the nodes (agents) A01 through A13 are connected to node B1 and node A13 is connected to node B2. The histogram for this degree distribution connectivity topology would have B1 and B2 on the X axis with the Y axis value for B1 being 14 and for B2 being 1. Such a current degree distribution topology as compared to the established criteria shows that the current topology is vulnerable to almost complete system failure due to attack on node B1. Therefore, a recommendation is made to achieve the topology of the criterion of a system having a topology that is less vulnerable. This is accomplished by having half of the agents (no specific ones) of the group A01 through A13 be connected to node B1 and the other half (no specific ones) be connected to node B2. Thus, the inter-agent degree distribution relationships are changed to establish a new topology that is (somewhat) more random and therefore more robust. The histogram for this topology would have a Y axis value of 7 for each of B1 and B2.

The principal reference to Kennedy neither teaches nor suggests the above claimed subject matter. The purpose of the Kennedy patent is to operate a wireless network, more particularly a mobile ad hoc network, such that reliable communication can be established between a source node  $S_n$  and a destination node  $D_n$ . This alone is different from the subject matter of the present invention, which is directed to a data processing system. As set forth in [0011] of Kennedy, a method is used such that the routes of the network are discovered and used, route failure is predicted, and maintenance is performed on the network based upon the predicted route failure.

It is true that Kennedy's network has a topology. However, the topology of interest is one that is essentially geographically linear between the source node  $S_n$  and the destination node  $D_n$ . That is, all that Kennedy really wants to know is can his network provide a communication path from  $S_n$  to  $D_n$ . His nodes are not concerned with inter-node (inter-agent) degree distribution connectivity relationships of one node relative to all of the other nodes in the network. At best a Kennedy node is only concerned with its neighboring connected nodes. In summary, the claimed invention is directed to the statistics of degree distribution connectivity (to

how many other nodes is a node connected). Kennedy is directed to establishing a connection path between  $S_n$  and  $D_n$  and neither teaches nor suggests degree distribution connectivity relationships.

The Examiner considers that the step of “obtaining the current status of the system topology”, as recited in the claims prior to this amendment, is found in Kennedy through the “route discovery”. As discussed above relative to the amended claims, the information that is obtained in the invention is of the topology of the inter – agent degree distribution connectivity relationships. The “route discovery” ( $S_n$  to  $D_n$ ) step of Kennedy does not correspond to this. Reference is made to [0030] of Kennedy, which states: “Referring now to Figs. 2 and 3, a method for operating a mobile ad hoc network 10, e.g. by discovering routes from a source node to a destination will now be described”. (Emphasis added) Thereafter Kennedy describes the discovery step in terms of predicting how the network will respond. For example, he states at line 9 of paragraph [0031] : “Future network dynamics and/or topology are predicted (block 82), and routes including partial routes or complete routes, are discovered (block 84) along predicted future – needed routes in the network based upon the predicted future – network dynamics and/or topology.” (Emphasis added). Thus it is clear that the “discovery” step of Kennedy is not the same as the “obtaining information on the current topology” step of the present invention.

Kennedy makes no recommendation to his nodes on how to change inter-node connectivity relationships to obtain a new topology that more closely matches the agent degree distribution connectivity relationships topology of an established criterion. He substitutes a new network having a different route (see Kennedy [0029]). This might well require using nodes that are not in the current network. Kennedy also does not seem to worry about attacks on his network, or random and scale free node degree distribution connectivity relationship topologies. He only wants to have a communication path from  $S_n$  to  $D_n$ .

In the Office action, the Examiner relies on [0039-0040] for the claimed feature of “obtaining information”. It appears the Examiner broadly constructs these two paragraphs within the context of the wireless routing system of Kennedy to read on establishing information of a system topology. Regardless, it does not teach the second part of the “obtaining information” element of the amended independent claims 1, 23 and 42, this being how the current agent degree distribution connectivity topology compares to the agent degree distribution connectivity topology of at least one of a plurality of established criterions.

In paragraph 21. of the Action the Examiner refers to paragraphs [0090-0109] of Kennedy and for the step of comparing the obtained information to at least one of the plurality of established criterions. A fair reading of this portion of the Kennedy specification is that it deals with the repair of broken nodes and the prediction of how the routes can be substituted to keep a reliable communication path between points  $S_n$  and  $D_n$ . This is not the comparison made by the currently claimed invention. The types of topologies, statistical versus geographical, are fundamentally different.

Further, Kennedy neither teaches nor suggests making recommendations to those of the plurality of nodes that would have to modify their relationships to the other nodes so as to obtain a new topology that corresponds to that of one of a plurality of criterions. In fact, it is not clear that Kennedy even teaches a topology for each of a plurality of established system criterions. Kennedy does teach a plurality of routes that are available for use, such as by substitution. But there does not seem to be any comparison of the topology of one route with respect to another.

The independent claims all set forth that at least one recommendation is made so that a new agent degree distribution connectivity system topology will be established that is closer to the same type of topology of one of the established criterions. Using the principles of the invention the overall system topology will be tuned according to established degree distribution connectivity criterions or goals. Kennedy only uses techniques that discover and evaluate "routes" and that perform "route maintenance" with an eye toward maintaining a communications network. Unlike Kennedy, the current invention is not addressed to "repairing the network", but to modifying the degree distribution connectivity relationships topology. Kennedy focuses exclusively on changing the routes taken by messages in order to cope with node failures. See [0029] of Kennedy. In contrast to this, the present invention can be used to cause agents to re-evaluate possible service-providers and elect to change to a "better" service provider, e.g., where no node failure is contemplated, and where the meaning of "better" has nothing to do with maintaining global network connectivity as in Kennedy.

In paragraph 20. of the Action, in discussing claim 50 the Examiner refers to various paragraphs of the Kennedy reference as disclosing the use of a histogram to determine the current topology of the inter— agent relationships. These paragraphs of Kennedy deal with the use of various statistical approaches used to determine network reliability and predictability.

They do not specifically disclose the use of a histogram which is a convenient tool that can be used to determine the inter— agent degree distribution connectivity relationships.

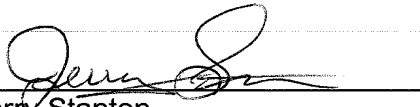
For the reasons given above, it is clear that Kennedy neither teaches suggests the novel and advantageous features of the subject matter as now set forth in the independent claims 1, 23 and 42. Accordingly, these claims clearly should be allowed together with their respective dependent claims 5, 15, 21, 24, 26, 42, 47, 50 and 51 that also are rejected as being anticipated by Kennedy.

### **Claim Rejections- 35 USC §103**

The other claims in the application depend directly or ultimately from one of the independent claims and are rejected over the combination of Kennedy and one or more of the secondary references. The addition of any one or more of the secondary references to the Kennedy reference does not cure the basic defect of Kennedy in meeting the novel features of the invention as set forth in the independent claims. Therefore, these claims also are patentable and should be allowed.

The Examiner is respectfully requested to reconsider the subject matter of this application and pass it to issue. Prompt and favorable action is respectfully requested.

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